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MISCELLANEOUS NOTE

16. ON THE MIGRATION OF THE SWALLOWTAIL, *POLYDORUS HECTOR* (LINNAEUS) [LEPIDOPTERA: INSECTA], OVER SEA[1]

(*With two text-figures*)

Reviewing our existing knowledge of butterfly migrations, Williams (1950) has drawn attention to the need for more precise information from different parts of the world regarding this aspect of insect life. Since the preponderance of existing records pertain to overland migrations, instances of migratory movements over the sea are of special interest.

Williams (1927) cited the few instances on record of the swallowtail, *Polydorus hector* (Linnaeus), one of the commonest butterflies of our plains, undertaking migratory flights overland, and also crossing over the sea between India and Ceylon. Instances of the latter type pertain to sight records or captures made very near the coast with one exception, namely von Frauenfeld's (1867) capture of six individuals aboard S. S. Novara, about 200 miles off Ceylon, on the way to St. Paul. Unfortunately most records are lacking in detail regarding the direction of flight, the prevailing weather conditions, etc. However, on the data available, Williams (1930: 46) concluded that *Polydorus hector* 'passes from India to Ceylon, or vice versa with some regularity in February, March, and April'.

From about the beginning of October, *P. hector* abounds around Mandapam and at any one time of the day several may be seen flitting about the Drumstick Tree (*Moringa pterygosperma* Linnaeus) for which plant, so common on the campus of this Research Station, it shows particular preference, and on one of which I have seen several hundreds roosting on successive nights. To a certain extent, the occurrence of this butterfly also coincides with the commencement of the NE. monsoon. On several occasions in October 1959 I observed regular flights of *P. hector* from the mainland in the direction of the chain of coral islands lying off the Ramnad coast in the Gulf of Mannar (Text-fig. 1). Subsequently I was able to make more detailed observations on five days while out at sea in this area and these are summarised below:

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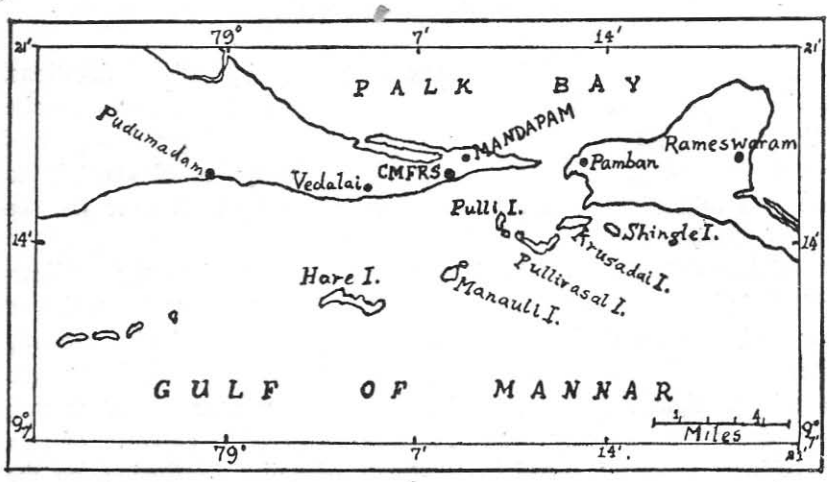
[1] Published with the permission of the Chief Research Officer, Central Marine Fisheries Research Station, Mandapam Camp.

5 *November* 1959. Time: 09.00 to 11.30 hours. Place: half-a-mile out at sea between CMFRS[2] and Vedalai. Several *P. hector* were seen migrating from the mainland towards Manauli and adjacent islands; flight thin and diffuse (4 to 6 noticeable at a time); course steady without any deviations; flight 3 to 6 metres above sea-level. None seen approaching mainland. Weather: sky



Text-fig. 1. Map showing part of the Ramnad Coast and the adjacent islands in the Gulf of Mannar.

overcast, calm, with hardly any breeze. Temp.: max. 29° C.; min. 26° C. Humidity 90%[3].

6 *December* 1959. Time: 09.15 to 11.30 hours. Place: same as on 5-11-'59. Migration of *P. hector* from mainland to islands, numerically more than on previous occasion, 36 being counted within 3 minutes. Flight steady, low, not more than 2 to 3 metres above water level. Weather: sky slightly overcast; steady breeze from mainland. Temp. max. 29° C.

21 *January* 1960. Time: 09.30 to 11.30 and 14.30 to 17.15 hours. Place: to and fro between CMFRS and Pudumadam about 12 miles SW. along Ramnad Coast. Weather: Sky slightly overcast in the morning, clear in the afternoon, Temp.: max. 29° C., min. 24° C. Humidity 90%.

Numerous *P. hector* were seen migrating from Manauli and Hare Islands towards the mainland between 09.30 and 11.30 hours. From the boat travelling at a speed of 6 knots, 67 butterflies were counted

[2] Central Marine Fisheries Research Station.

[3] Data regarding temperature and humidity pertain to Pamban as given in the Regional Daily Weather Reports of the Regional Meteorological Centre, Madras.

in a period of five minutes. One apparently completely exhausted alighted on the water with wings spread out within five metres of the boat, but was seen in a few seconds to take off, its flight at first being a bit erratic, but when last seen it was flying vigorously towards the mainland which was about a mile away from the place of observation. None seen flying more than three metres above water level, while most kept very close to the water on account of the fairly strong head wind. The fact that none of the butterflies was encountered while travelling opposite the gaps between the islands strongly suggests that they cross in a more or less straight line course from the islands to the parts of the mainland just opposite. During this period of observation, not a single individual was seen flying from the mainland to the islands.

On the return trip from Pudumadam to CMFRS between 14.30 and 17.15 hours none was seen in flight crossing over to the mainland or vice versa.

29 *January* 1960. Time: 17.45 hours. Place: about 3½ miles from the mainland towards Manauli Island. Weather: strong wind blowing from the mainland and choppy seas. Temp. max. 29° C., min. 25° C. Humidity 80%. One dead *P. hector* was seen floating. None seen in flight between mainland and Manauli Island between 16.45 and 18.00 hours.

31 *January* 1960. Time: 12.00 hours. Place: 2 miles from Manauli Island towards mainland. Weather: Sea relatively calm; steady breeze blowing from the mainland. Temp. max. 29° C., min. 25° C. Humidity 85%. Three *P. hector* were seen almost at the same time, all flying about 2 metres above water and heading towards Manauli Island. None seen crossing in the opposite direction.

From about the last week of January these butterflies appeared to be much fewer in numbers in the campus area and on two trips made to Pudumadam on 6 and 11 February none was seen in flight over the sea. After a few weeks' absence, on my return to Mandapam in the last week of March, I found that they had almost completely disappeared from the scene.

The above observations and the many reports I have received from my co-workers going out on regular fish and plankton collections point definitely to a migratory movement of the swallowtail north to south, from the mainland to the chain of islands mentioned above, and at certain periods vice versa. A few noteworthy features are:

1. The migration is thin and diffuse with generally 5 or 6 individuals visible to the observer at a time.

2. The steady and non-deviating pattern of flight.

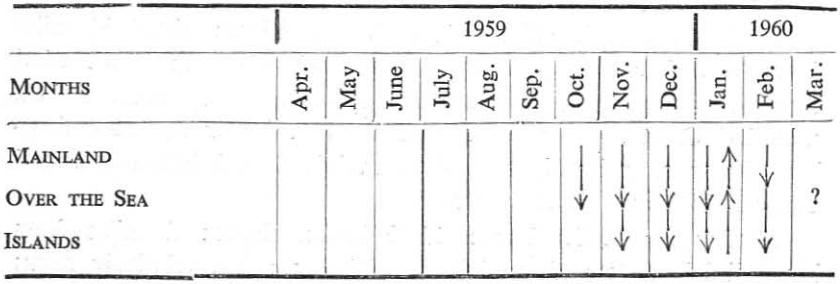
3. When there is a strong head or tail wind, the butterflies keep as close to the water as possible.

4. When on sea, the direction of flight of a single individual is typical of the direction of the whole flight at a particular time.

5. The to and fro flights between the mainland and the islands may be indicative of 'return' flights.

6. It appears likely that, when exhausted in flight, they alight on the water for shorter or longer periods as seen in one instance on 21-1-'60.

7. The peak activity appears to be from November to about the middle of January. However, it is not known whether this would change from year to year, for Williams (1930) records February, March, and April as the months during which migratory flights of this species between India and Ceylon and vice versa take place.



Text-fig. 2.
(Arrows indicate direction of flights in the different months)

8. Not once did I see *P. hector* being preyed upon when in flight over the sea. This is quite unlike what Evershed (1912) found for this species on its overland migrations especially when migrating across Palni Hills, south India, when it is specially liable to attack by birds.

9. All migratory flights over the sea were observed during the earlier half of the day and hardly any after 14.00 hours.

The voluntary nature of these flights and the purposeful manner in which they are carried out would amaze any observer. We do not know why this or for that matter many other species voluntarily migrate over sea and our knowledge about migratory movements is incomplete on several scores, such as the periods when these migratory flights are undertaken, the size of migratory movements, whether in this case the chain of islands act as only a stepping stone for the colonisation of areas beyond and vice versa, whether those that undertake the flights are surplus populations from overpopulated areas, the

relationship between migration and breeding area, whether the return flights are undertaken by the same individuals, whether there is any difference between the migrants and non-migrants in this species, the size, age, and maturity of migrants, the sex ratio of the migrants, their survival rate, whether at any time more than one species is involved in these migratory flights, whether they resort to nocturnal migratory flights, the influence of weather conditions on the pattern of migration, etc. I hope that this note will create an urge in some of our readers to observe and try to unravel the mysteries of this aspect of butterfly life, which is as fascinating as the study of other animal migrations.

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March 31, 1960.

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[Dr. C. B. Williams asked for information about insect migration in a paper published in this journal in 1938 (*J. Bombay nat. Hist. Soc.* **40**: 439-457. The migration of butterflies in India,) and the request is repeated in his book on insect migration, a review of which appears elsewhere in this issue. The particulars required are briefly indicated by the headings of the standard form in which he files details of the records received: year, month, date and time of day, locality, direction of flight, direction and strength of wind, numbers seen, number captured and where they are kept, sex, condition (fresh, worn), notes (extent of flight, speed, pairing, egg-laying, etc.), present and past weather conditions (temperature, rain, sun, cloud, thunder, barometer, etc.), height above the ground/sea, name and address of observer, name of species, other species in the flight (name and number), identified by. All information should be put down at the time of the observation or as soon thereafter as possible. Specimens should be captured and sent in; as many as fifty is not too much

and some of them should be preserved in spirit for examination for fat reserve and state of development of the eggs. Specimens are of value even if they are not in perfect condition. If the flight lasts over several days observations should be made as to the earliest and latest hours of activity and attempts should be made to discover what the insects do at night.—EDS.]